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ANALYTICAL APPROXIMATIONS

Volume 28

Cecil Hastings, Jr.
Elaine Hastings

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The RAND Corporation
1700 MAIN ST. • SANTA MONICA • CALIFORNIA

Analytical Approximation

Gaussian Error Integral: To better than .0005 over $(-\infty,+\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

$$\doteq \frac{x}{\sqrt{x^2+(a_0+a_2x^2+a_4x^4)^{-4}}}$$

wherein

$$a_0 = 1.0635$$

$$a_2 = .1535$$

$$a_4 = .0341$$

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Analytical Approximation

Gaussian Error Integral: To better than .00004 over $(-\infty, +\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

$$\doteq \frac{x}{\sqrt{x^2 + (a_0 + a_2 x^2 + \dots)^{-4}}}$$

wherein

$a_0 = 1.06214$

$a_2 = .16193$

$a_4 = .02431$

$a_6 = .00266$

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Analytical Approximation

Gaussian Error Integral: To better than .000006 over $(-\infty, +\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

$$\doteq \frac{x}{\sqrt{x^2 + (a_0 + a_2 x^2 + a_4 x^4 + \ldots)^{-4}}}$$

wherein

$$a_0 = 1.062273$$

$$a_2 = .160871$$

$$a_4 = .026161$$

$$a_6 = .001648$$

$$a_8 = .000158 \, .$$

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Analytical Approximation

Gaussian Error Integral: To better than .00007 over $(-\infty, +\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

$$\doteq \frac{x}{\sqrt{x^2 + (a_0 + a_2 x^2 + a_4 x^4)^{-8}}}$$

wherein

$$a_0 = 1.03074$$

$$a_2 = .07761$$

$$a_4 = .01019$$

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Analytical Approximation

Gaussian Error Integral: To better than .000006 over $(-\infty,+\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}\,dt$$

$$\doteq \frac{x}{\sqrt{x^2+(a_0+a_2x^2+a_4x^4+a_6x^6)^{-8}}}$$

wherein

$a_0 = 1.030653$

$a_2 = .078127$

$a_4 = .009592$

$a_6 = .000157$

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Analytical Approximation

Gaussian Error Integral: To better than .000005 over $(-\infty, +\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$
$$\doteq \frac{x}{\sqrt{x^2 + (a_0 + a_2 x^2 + a_4 x^4)^{-10}}}$$

wherein

$a_0 = 1.024457$

$a_2 = .062087$

$a_4 = .007205$

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